PATENT

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Date: 1-14-02

Himanshu S. Amin

#9/Appeal Brief

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re patent application of:

Applicant(s): Carl J. Dister

Serial No: 09/164,206

Filing Date: September 30, 1998

Examiner: Craig Miller

Art Unit: 2857

Title: PACKAGING FOR DYNAMOELECTRIC MACHINE DIAGNOSTIC SYSTEM

Box AF
Assistant Commissioner for Patents
U.S. Patent and Trademark Office
Washington, D.C. 20231

APPEAL BRIEF

Dear Sir:

Applicant submits this brief in connection with an appeal of the above-identified application. Enclosed is a check for $320.00 for the fee associated with this brief.

I. Real Party in Interest (37 C.F.R. § 1.192(c)(1))

The real party in interest in the present appeal is RELIANCE ELECTRIC TECHNOLOGIES, LLP, the assignee of the present application.

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II. Related Appeals and Interferences (37 C.F.R. § 1.192(c)(2))

Appellant, appellant's legal representatives, and/or the assignee of the present application are unaware of any appeals or interferences which will directly affect, or be directly affected by or have a bearing on the Board's decision in the pending appeal.

III. Status of Claims (37 C.F.R. § 1.192(c)(3))

Claims 1-25 are pending in the application. The rejection of claims 1-25 is appealed.

IV. Status of Amendments (37 C.F.R. § 1.192(c)(4))

The amendment to claim 2, filed subsequent to final rejection, to correct a spelling error has been entered as being directed to a formality.

V. Summary of Invention (37 C.F.R. § 1.192(c)(5))

The present invention relates to packaging for a machine diagnostic system for on-line diagnosis of a dynamoelectric machine (p. 1, ll. 15-16). The machine diagnostic system includes a machine diagnostic module which collects data relating to the operation of the machine and a package which is mounted to an outer mounting surface of the machine. The package comprises a container which contains the machine diagnostic module and a heat dissipation device situated between the container and the mounting surface of the machine. The heat dissipation device dissipates heat generated by the machine into the surrounding air thereby minimizing heat transfer to the container and thus the machine diagnostic module (p. 7, ll. 4-12). The machine diagnostic system includes a plurality of sensors coupled to various parts of the motor. The sensors may include, for example, temperature sensors, motor voltage sensors, vibration sensors, encoders, and current sensors, lube sensors, flux sensors, acoustic sensors, brush sensors, and/or ultrasonic sensors (p. 7, ll.24-27 - p. 8, ll. 1-2).

The heat dissipation device includes a first set of fins, which transfer, by convection, the heat generated by the machine into the surrounding air. Each of the fins has a base that engages the outer mounting surface of the machine and a tip that engages the container. Heat is conducted through the base towards the tip and the heat is transferred, by convection, into the surrounding air during this conduction (p. 3, ll. 26-27 - p. 4, ll. 1-4).

When the package is mounted on the machine, a series of passageways are formed by the mounting surface of the machine, the bottom wall of the container, and the lateral sides of a first set of fins (reference numerals 101-119). If a single common exhaust airflow fan design is used, the exhaust air will travel through each of these passageways in a substantially uniform manner. If a baffle arrangement is used to divide the exhaust air into component airflows, these will be directed to appropriate regions of the heat dissipation device (p. 17, ll. 3-10). During operation of the motor, heat from its mounting surface will be transferred to the first set of fins. Due to the relatively large surface area of the fins' lateral sides, a substantial amount of heat will be transferred, by convection, to the surrounding air (p.17, ll. 17-21). A second set of fins (reference numerals 121-125) are generally ribbon-shaped or strip-shaped and are of a lesser height than the first set of fins. Accordingly, the distal longitudinal edges of the second set of fins do not contact the motor mounting surface. As such, the second set of fins function as traditional fins in that they transfer heat absorbed by the container to the surrounding air (p. 18, ll. 1-19).

In the present invention, the heat transfer objectives are opposite from a traditional fin heat-transfer situation. As indicated above, the fins are attached to the container, but the container is not the heat-generating object. Thus, for heat transfer purposes, the container-attached longitudinal edges of the fins are considered the tips of the fins and the motor-engaging longitudinal edges of the fins are considered the bases for the fins. For this reason, unlike the conventional fins, a high thermal conduction coefficient is preferred to maximize temperature variations from its base to its tip. In other words, the temperature differential between the tip of the fin and the base of the fin is preferably as high as possible. It is also desirable for the fin material to have a high thermal convection coefficient to maximize heat dissipation into the surrounding air (p. 16, ll. 7-21).

The machine diagnosis system also includes a network backbone and a host computer. The host computer is coupled to the network backbone to allow on-line diagnosis of the machine. More specifically, data will be collected from the machine and partially processed by a diagnostic module so as to produce diagnostic data. The diagnostic data is provided to the host computer for analysis to render a health assessment of the machine (p. 8, ll. 3-12).

It is respectfully submitted that the cited art fail to teach or suggest these features, as will be discussed in greater detail below.

VI. Statement of the Issues (37 C.F.R. § 1.192(c)(6))

A. Whether claims 1-25 are patentable under 35 U.S.C. §103(a) as being as being obvious over Emori *et al.* (U.S. 5,940,272) or Root *et al.* (U.S. 3,229,757).

VII. Grouping of Claims (37 C.F.R. § 1.192(c)(7))

For the purposes of this appeal only, the claims are grouped as follows:

Claims 1-18 stand or fall together; claims 19-22 stand or fall together; claims 23-24 stand or fall together; and claim 25 stands or falls alone.

VIII. Argument (37 C.F.R. § 1.192(c)(8))

A. Rejection of Claims 1-25 Under 35 U.S.C. §103(a)

Claims 1-25 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Emori *et al.* or Root *et al.* A reversal of the rejection is respectfully requested for at least the following reasons.

i. ***Both the Emori et al. patent and the Root et al. patent, alone and in combination, fail to teach or suggest a package comprising a container which contains a machine diagnostic module and a heat dissipation device, positioned between the container and an outer mounting surface of a machine, which dissipates heat generated by the machine into surrounding air thereby minimizing heat transfer to the container, as recited in claim 1.***

Neither the Emori *et al.* patent nor the Root *et al.* patent, alone or in combination, teach or suggest a heat dissipation device, positioned between a container and an outer mounting surface of a machine, which dissipates heat generated by the machine into the surrounding air. Rather, Emori *et al.* is directed to a heat sink apparatus that comprises a plurality of electric parts mounted thereon and a casing with a plurality of projections for radiating heat generated by the electric parts (col. 1, ll. 56-63). Similarly, Root *et al.* is directed to a heat sink apparatus for heat-generating electronic components, such as resistors, transformers, and semi-conductor devices (col. 1, ll. 10-17). Thus, both Emori *et al.* and Root *et al.* are directed to heat sink apparatuses which prevent excessive operating temperatures in heat-generating electronic components. In contrast, the structure of claim 1 is a heat dissipation device which protects sensor components in a machine diagnostic system mounted on a dynamoelectric machine from ***heat generated by the machine***.

As stated above, the heat sink apparatuses of both Emori *et al.* and Root *et al.* are used to dissipate heat away from the electronic components. If such a heat sink were used to dissipate heat generated from the dynamoelectric machine of the present invention, the heat sink would be expected to direct heat from the machine towards the machine diagnostic module since the diagnostic module is mounted on top of the heat dissipation device. Thus, one of ordinary skill in the art would not expect the modification of the heat sink apparatuses of Emori *et al.* and Root *et al.* to protect the diagnostic module from the heat generated by the dynamoelectric machine. Because one of ordinary skill in the art would not have a reasonable expectation of success to use the heat sink apparatus of Emori *et al.* or Root *et al.* or the combination thereof to protect a machine diagnostic module from heat generated by a dynamoelectric machine, the structure of claim 1 is not made obvious by Emori *et al.* or Root *et al.* or the combination thereof. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Furthermore, if a reference is cited that requires some modification in order to meet the claimed invention or requires some modification in order to be properly combined with another reference and such a modification destroys the purpose or function of the invention disclosed in the reference, one of ordinary skill in the art would not have found a reason to make the claimed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). The apparatuses described in both Emori *et al.* and Root *et al.* are designed to dissipate heat generated by the electronic components mounted thereon into the surrounding air. Thus, in both Emori *et al.* and Root *et al.*, the base of a heat dissipating fin is attached to the electronic components and the tip of the fin is suspended in the surrounding air (see Fig. 1 of Emori *et al.*). In such a situation, the fin material has a low thermal conduction coefficient to minimize temperature variations from its base to its tip. In other words, the temperature differential between the tip of the fin and the base of the fin is preferably as low as possible.

Additionally, if the heat sinks of Emori *et al.* or Root *et al.* were mounted with the tips of the fins attached to the heated dynamoelectric machine as suggested by the Examiner, the heat from the electronic components could not dissipate since the tips of the fins would be heated by the dynamoelectric machine. The modification of the heat sinks of Emori *et al.* or Root *et al.* suggested by the Examiner would destroy the purpose or function of the heat sinks. Therefore, Emori *et al.* or Root *et al.* are improper references and do not make obvious claim 1 of the present invention.

As stated in the Summary of Invention section, in the structure of claim 1, the heat transfer objectives are opposite those of Emori *et al.* and Root *et al.* The structure of claim 1 requires that the heat dissipation device protect the sensor components mounted thereon from heat generated by a dynamoelectric machine. Thus, in the present invention, fins are attached to a container, but the container is not the heat generating object. Instead, for heat transfer purposes, the container-attached edges of the fins are considered the tips of the fins and the motor-engaging edges of the fins are considered the bases for the fins. For this reason, in contrast with the fins described in Emori *et al.* and Root *et al.*, it is undesirable for the fin material to have a low thermal conduction coefficient. A high thermal conduction coefficient is instead preferred to maximize temperature variations from its base to its tip. In other words, the temperature differential between the tip of the fin and the base of the fin is preferably as high as possible. Thus, because the modification one of ordinary skill in the art would have to make in order to meet the claimed invention would destroy the purpose and/or function of the invention disclosed in both Emori *et al.* and Root *et al.*, neither Emori *et al.* nor Root *et al.*, alone or in combination, make obvious the structure of claim 1.

Therefore, claim 1 is non-obvious over the cited art. Claims 2-18 depend directly or indirectly from independent claim 1. Accordingly, a reversal of the rejection of claims 1-18 is respectfully requested.

ii. Both the Emori et al. patent and the Root et al. patent, alone and in combination, fail to teach or suggest a fan generating an exhaust airflow and wherein the exhaust airflow is directed towards a first set of fins so that the exhaust air may travel between at least some of the fins thereby continuously conveying the surrounding air away from a container, as recited in claim 19.

Neither the Emori *et al.* patent nor the Root *et al.* patent, alone or in combination, teach or suggest a fan generating an exhaust airflow. In the Office Action dated August 14, 2001, the Examiner stated:

> Because fin cooling fan are generally within the art of device cooling, because it is known generally within the cooling art that heat dissipating fins can be cooled with a fan, because neither Root *et al.* nor Emori *et al.* preclude the use of a cooling fan, and because the applicant fails to claim criticality to such a cooling fan, it would have been obvious to one of ordinary skill in the art at the time the invention was made to include a fin cooling fan within the devices of either Root

> *et al.* or Emori *et al.* as modified above so as to provide enhanced device cooling or as a mere obvious design choice absent a showing of unexpected results or synergistic effect by applicant.

However, as stated in Okajima v. Bourdeau, 261 F.3d 1350, 59 USPQ2d 1795 (Fed. Cir. 2001):

> The level of skill in the art is a prism or lens through which a judge, jury, or the Board of Patent Appeals and Interferences views the prior art and the claimed invention. This reference point prevents these factfinders from using their own insight or, worse yet, hindsight, to gauge obviousness. Skill in the art does not act as a bridge over gaps in substantive presentation of an obviousness case, but instead supplies an important guarantee of objectivity in the process.

Thus, because a fan generating exhaust airflow is absent from both Emori *et al.* and Root *et al.* and neither Emori *et al.* nor Root *et al.* provide any suggestion to modify the heat sink apparatuses to employ such a fan, the Examiner can not broadly use the level of skill in the art argument to fill in the gaps between the present invention and the teachings of Emori *et al.* and Root *et al.*

Furthermore, in the present invention, the exhaust air from the fan is directed through the heat dissipation device to minimize heat transfer from the motor to the container. If such a system were used to direct cooling air through the fins of a heat sink apparatus, as described in both Emori *et al.* and Root *et al.*, the exhaust airflow through the fins would not provide enhanced cooling of the electric components as suggested by the Examiner in the Office Action dated August 14, 2001. Thus, one of ordinary skill in the art would have no motivation modify Emori *et al.* or Root *et al.*, alone or in combination, to use a fan generating an exhaust airflow, wherein the exhaust airflow is directed towards a first set of fins so that the exhaust air may travel between at least some of the fins thereby continuously conveying the surrounding air away from a container, as recited in claim 19.

Therefore, claim 19 is non-obvious over the cited art due to the above stated reasons in addition to the reasons set forth with respect to claim 1, since claim 19 depends indirectly from claim 1. Claims 20-22 depend directly or indirectly from dependent claim 19. Accordingly, a reversal of the rejection of claims 19-22 is respectfully requested.

iii. Both the Emori et al. patent and the Root et al. patent, alone and in combination, fail to teach or suggest a heat dissipation device which includes a first set of fins, at least one of the fins having a base which engages an outer mounting surface of a dynamoelectric machine and a tip which engages the container whereby heat is conducted through the base towards the tip and is transferred by convection into the surrounding air, as recited in claim 23.

Neither Emori *et al.* nor Root *et al.*, alone or in combination, teaches or suggests a heat dissipation device which includes a first set of fins, at least one of the fins having a base which engages an outer mounting surface of a dynamoelectric machine and a tip which engages a container whereby heat is conducted through the base towards the tip. Rather, as discussed in section VII(A)(i) above, both Emori *et al.* and Root *et al.* teach heat sink apparatuses which dissipate heat generated from electronic components mounted thereon. Further, the heat sink apparatuses of Emori *et al.* and Root *et al.* must possess a sufficiently low composite thermal resistance in order that generated heat will be dissipated from the operating electronic component to the ambient surroundings with sufficient rapidity (see Root *et al.*, col. 1, ll. 45-50).

In direct contrast, in the present invention, it is undesirable for the heat dissipation device to have a low thermal conduction coefficient. A high thermal conduction coefficient is instead preferred to maximize temperature variations from its base to its tip. A high thermal convection coefficient is also desirable in the present invention to maximize heat dissipation into the surrounding air. Thus, modifying Emori *et al.* or Root *et al.* or the combination of Emori *et al.* and Root *et al.* to meet the elements of claim 23 would destroy the purpose and/or function of the inventions disclosed in Emori *et al.* and Root *et al.* Accordingly, one of ordinary skill in the art would not have found a reason to make the claimed modification and a reversal of this rejection is respectfully submitted.

Therefore, claim 23 is non-obvious over the cited art due to the above stated reasons in addition to the reasons set forth with respect to claim 1. Claim 24 recites a method for temperature of a diagnostic having acts with similar elements as recited in claim 23. Accordingly, a reversal of the rejection of claims 23-24 is respectfully requested.

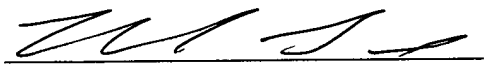
iv. Both the Emori et al. patent and the Root et al. patent, alone and in combination, fail to teach or suggest a network backbone connected to a machine diagnostic module and a host computer connected to the network backbone able to receive diagnostic data provided from the machine diagnostic module and to allow on-line diagnosis of the machine, as recited in claim 25.

Neither Emori *et al.* nor Root *et al.*, alone or in combination, teach or suggest a network backbone connected to a machine diagnostic module and a host computer connected to the network backbone able to receive diagnostic data provided from the machine diagnostic module and to allow on-line diagnosis of the machine. Such a system is absent from both Emori *et al.* and Root *et al.* Furthermore, there is no suggestion in either Emori *et al.*, Root *et al.*, or the combination of Emori *et al.* and Root *et al.* to modify the references to employ such a system as neither reference discloses a machine diagnostic module nor any other device which provides diagnostic data. Because the references, alone or in combination, do not teach or suggest every claim limitation, it is respectfully submitted that the Examiner has not established a case of *prima facie* obviousness. Accordingly, a reversal of the rejection of claim 25 is respectfully requested.

IX. Conclusion

For at least the above reasons, the claims currently under consideration are believed to be patentable over the cited references. Accordingly, it is respectfully requested that the rejections of claims 1-25 be reversed.

Respectfully submitted,
AMIN & TUROCY, LLP



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X. Appendix of Claims (37 C.F.R. § 1.192(c)(9))

1. In combination, a dynamoelectric machine and a machine diagnostic system for on-line diagnosis of the machine;

the machine diagnostic system comprising a machine diagnostic module which collects data relating to operation of the machine and a package which is mounted to an outer mounting surface of the machine; and

the package comprising a container which contains the machine diagnostic module and a heat dissipation device, positioned between the container and the outer mounting surface of the machine, which dissipates heat generated by the machine into surrounding air thereby minimizing heat transfer to the container.

2. The combination set forth in claim1, wherein the heat dissipation device includes a first set of fins which transfer the heat by convection into the surrounding air.

3. The combination set forth in claim 2, wherein each of the fins in the first set of fins has a base which engages the outer mounting surface of the machine and a tip which engages the container whereby heat is conducted through the base towards the tip and is transferred by convection into the surrounding air.

4. The combination set forth in claim 3, wherein the heat dissipation device includes a front edge and a rear edge and wherein the first set of fins include at least some fins which extend between the front edge and the rear edge.

5. The combination set forth in claim 4, wherein at least some of the fins in the first set of fins extend only partially between the front edge and the rear edge.

6. The combination set forth in claim 4 wherein at least some of the fins in the first set of fins extend in a generally straight path.

7. The combination set forth in claim 4, wherein at least one of the fins in the first set of fins extends in a curved path.

8. The combination set forth in claim 4, wherein at least some of the fins in the first set of fins are of different widths.

9. The combination set forth in claim 2, wherein the first set of fins are attached to the container.

10. The combination set forth in claim 9, wherein the fins are integral with the container.

11. The combination set forth in claim 10, wherein the fins are formed in one piece with the container.

12. The combination set forth in claim 11, wherein the container and the heat dissipation device are made of at least one of: cast iron, dicast aluminum, extruded aluminum, machined aluminum, and thermally conductive plastic.

13. The combination set forth in claim 2, wherein said container is formed by a series of walls and the fins project outwardly from one of the walls.

14. The combination set forth in claim 13, wherein the fins in the first set of fins project perpendicularly from the one of the series of walls.

15. The combination set forth in claim 14, wherein the series of walls include a bottom wall and set of side walls extending upwardly from the side walls to form a box-like structure and wherein the first set of fins extend perpendicularly downward from the bottom wall.

16. The combination set forth in claim 15, wherein the machine mounting surface is flat and wherein the tip-to-base dimension of each of the fins in the first set of fins is substantially the

same.

17. The combination set forth in claim 15, wherein the machine mounting surface is curved and wherein the tip-to-base dimension of the first set of fins varies to form a contour corresponding to the curved machine mounting surface.

18. The combination set forth in claim 2, wherein the machine is an electric motor including a rotor.

19. The combination set forth in claim 2, wherein the machine comprises a fan generating an exhaust airflow and wherein the exhaust airflow is directed towards the first set of fins so that the exhaust air may travel between at least some of the fins thereby continuously conveying the surrounding air away from the container.

20. The combination set forth in claim 19, wherein the package further comprises a second set of fins having their bases attached to the container and their tips positioned in the passageway through which the airflow passes.

21. The combination set forth in claim 19, wherein the machine further comprises a shroud which directs the airflow towards the heat dissipation device.

22. The combination set forth in claim 21, wherein the first set of fins define a plurality of regions and wherein the shroud includes a baffle which divides the airflow into a plurality of component airflow and which directs the component airflow towards the respective regions defined by the first set of fins.

23. A package for a diagnostic module of a dynamoelectric machine comprising:

a container to contain the diagnostic module; and a heat dissipation device which includes a first set of fins, at least one of the fins having a base which engages an outer mounting surface of the machine and a tip which engages the container whereby heat is conducted through the base towards

the tip and is transferred by convection into the surrounding air.

24. A method for regulating temperature of a diagnostic module of a dynamoelectric machine, comprising the steps of:

containing the diagnostic module within a container; and

employing a plurality of fins to facilitate dissipating heat generated by the machine into surrounding air to minimize heat transfer to the diagnostic module, wherein at least one of the fins has a base which engages the outer mounting surface of the machine and a tip which engages the container whereby heat is conducted through the base towards the tip and is transferred by convection into the surrounding air.

25. The combination set forth in claim 1 further comprising:

a network backbone connected to the machine diagnostic module; and

a host computer connected to the network backbone able to receive diagnostic data provided from the machine diagnostic module and to allow on-line diagnosis of the machine.